REMARKS

This is in response to the March 2, 2004 office action. Claims 24, 27, 33, 34, 42, and 44 have been amended. A petition for a one month extension of time and the $110 fee are submitted herewith.

Claims 24-46 were rejected under 35 USC 112, second paragraph, as being indefinite because of the use of the claim terms "second anode, terahertz radiation source and suitable period." The Examiner rejected the claims because he felt these terms rendered the claims indefinite. Claims 24, 27, 33, 34, 42 and 44 have been amended to remove the word "second" in response to this rejection and reconsideration is respectfully requested. The first and second anodes are set forth in the substitute specification at page 6 thereof. Applicants do not agree with the rejection insofar as the terms "terahertz radiation source" and "suitable period". "Terahertz radiation source[s]" are well known in the art and those skilled in the art know what is meant when by those terms. Terahertz radiation lies between and somewhat overlaps microwave and visible radiation (light). Terahertz radiation sources produce electromagnetic radiation in the wavelength regime 100 mm to 1 μm (which is also known a Millimetre (100-1mm), Submillimeter (1 mm-300 μm), Far Infrared (300 μm -10 μm), Near Infrared region (120 μm to 750 nm (visible light)). The Examiner's indication that it is unclear if the applicants' are claiming terahertz radiation in the form of electrons, ions, light, etc.. is not understood as in quantum mechanics the principle of duality applies and the radiation can be thought of simultaneously as particles and waves.

In regard to claim 38, the skilled person knows that a grating of a constant much smaller than the wavelength of the THz radiation will reflect the radiation. Since the THz source can be employed to generate mm to μm wavelength electromagnetic radiation, a grating of 0.3 mm to 0.3 μm would have the suitable wavelength respectively.

Therefore, it is not believed that the Examiner has met the prima facie burden the office must carry in asserting indefiniteness in this regard. As such the applicants have not amended the claims as they are believed to be perfectly clear and reconsideration is respectfully requested.

Claims 24-25 were rejected under 35 U.S.C. 103(a) as being unpatentable over Fleischer (899) in view of Wortmann 9726) and further in view of Schoessler et al. (Nanostructured Integrated Electron Source article). Claims 24-46 were rejected under 35 U.S.C. 103(a) as being unpatentable over Chang (550) in view of the Schoessler et al article.

All elements used to construct terahertz radiation sources before the claimed invention were macroscopic in size and fabricated as single elements, not integrated elements. It was not obvious to miniaturize the elements or how to miniaturize the elements. To form an integrated device which makes use of very short distances between the electron source, the lens, the grating and the anode to keep the electron in a bundle of high confinement and in a precise height of flight across the very fine metal grating, is the novelty of the invention, and is not taught or suggested by any known reference.

The article by Schoessler and Koops does not teach or suggest the construction of

a miniaturized terahertz radiation source on a chip. The Examiner seems to be suggesting that since macroscopic terahertz radiation sources are known and since Schoessler teaches the placement of a nanostructured electron source on a chip that it is obvious to construct a miniaturized terahertz radiation source on a chip. If the Examiner's suggestion were the law then no one could invent another integrated circuit as integrated circuit design techniques and processes are well known.

None of the references teach or suggest a beam deflector as claimed in claim 24.

The deflection systems 5 as shown in Fig. 1 of the application for patent are required to keep the beam in a constant height above the grating for optimum coupling of the electromagnetic wave field and the electron bunch which is a totally different application than that of Fleisher '899. Fleisher '899 deflects the electron beam as a variant of the angle theta and not to control the height of the beam across the rulings of the grating.

It is for at least these reasons that claims 24 and 25 are patentable over the combination of Fleisher, Wortmann and Schoessler. Reconsideration of claims 24 and 25 is requested.

Claims 24-46 were rejected under 35 U.S.C. 103(a) as being unpatentable over Chang (550) in view of the Schoessler et al article. On page 7 of the office action it is stated that "[c]laims 28-32 are rejected for being based upon a previously rejected base claim." Notwithstanding the rejection of claim 24, it is believed that the Examiner must read claims 28-32 onto a single reference or onto a multiplicity of references and state

why it is believed that the claims are anticipated or are obvious. It is believed that the Examiner may have found allowable subject matter in these claims and mistakenly believed that they were not allowable because they depend from claims the Examiner believed were not allowable. Reconsideration of claims 28-32 is respectfully requested as they have not been properly rejected.

In page 5 of the office action the Examiner states that Chang '550 teaches a field emitter but Chang Fig. 1 (ref. numeral 32) and Fig. 5B (ref. numeral 105) disclose a thermionic heated dispense cathode of pierce type. So it is respectfully suggested that the Examiner's suggestion that Chang teaches a field emitter is incorrect. So for at least this reasons reconsideration of claims 24-46 is respectfully requested.

In regard to claim 27, Chang teaches a vacuum housing for a 150 kV electron beam and such housing are generally Steel and employ 10 inch diameter tubes with flanges. There is a distinct difference between a steel housing and a silicon chip with a thickness of 0.1 inch.

In regard to claim 28, Chang uses mechanical alignment of the grid with external accessibility of the grating position and inclination. This is not comparable to the proposed electrical beam alignment, using prepared electrodes and deflector plates fabricated in nanolithography or optical lithography technology on the chip aside and under the grating.

In regard to claim 29, an intermediate accelerator followed by a lens is claimed and this is new and not previously known.

In regard to claim 30, the specific dimensions were previously not known and are new.

In regard to claim 31, this claim specifies a plurality of electrically isolated diffraction gratings in combination with the elements of claim 24.

In regard to claim 32, this claim specifies a getter pump and such small pumps cannot be used with state of the art machines and as such this claim presents new subject matter.

In regard to claim 33, this is allowable as being dependent on allowable claims 25.

In regard to claim 34, the voltage across the grating is adjusted to alter the electron velocity along the grating to precisely control the wavelength. Chang uses the acceleration voltage of the gun and thus does not control the wavelength as well.

In regard to claim 35, Chang necessarily employs steel technology and not micromechanical sealing of a window for the radiation to exit on top of a wafer.

In regard to claim 36, Chang does not disclose the micromechanical design of the getter pump structure connected to the Smith Purcell device chamber.

In regard to claim 37, Chang does not disclose anti reflection coating for the window to enhance the intensity of the emitted radiation.

In regard to claim 38, Chang does not disclose a magnetic and non-magnetic material to strengthen the intensity of emitted terahertz radiation.

In regard to claim 39, a novel modulating structure is claimed which is not disclosed by Chang.

In regard to claim 40, it is patentable as claim 24 is patentable.

In regard to claim 41, a microstructural monchromator is claimed and this is not taught by Chang.

In regard to claim 42, electrons are decelerated within the second anode structure and this claimed feature is not disclosed or suggested by Chang.

In regard to claim 43, several parallel beams are claimed for producing several radiation sources and Chang does not disclose this feature or structure.

In regard to claim 44, Chang does not disclose this structure.

In regard to claim 45, Chang does not disclose a beam fine control between deflection plates.

In regard to claim 46, Chang does not disclose a handheld device which is usable in any spatial orientation.

Claim 44 was amended to correct a misspelling.

There is no suggestion or motivation stated in Fleisher '899 or Wortmann '726 to miniaturize the components thereof. Nor does Schoessler suggest to combine its teachings with Fleisher '899 or Wortmann '726.

For the foregoing reasons, reconsideration of claims 24-46 is respectfully requested.

Respectfully Submitted,

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